Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_

**Honors Chemistry Periodic Table Test**

*STUDY GUIDE*

Test Format

* Fill-in-the-blank
* Valence electrons
* Multiple choice
* Periodic trends (ranking, circling, etc.)
* Short answer

Content

* History of periodic table (Mendeleev, originally arranged by atomic mass, periodic law)
* Properties and location of metals, nonmetals, and metalloids
* Properties and location of periodic families (alkali metals, alkaline earth metals, transition metals, halogens, and noble gases)
* Valence electrons
* Periodic trends: atomic radius, ionic size, electronegativity, ionization energy, and reactivity)
* Electron shielding

Practice Problems

**Part 1: Fill in the Blank**

Fill in each blank with the appropriate vocabulary term (11 points).

1. Metals become \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or positive ions, in chemical reactions. Nonmetals become \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or negative ions, in chemical reactions.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ represents how badly an atom wants one more electron, whereas \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ represents how difficult it is to remove an electron from an atom.
3. Copper is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which means that it can be made into wire.
4. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a non-valence electron that blocks some of the charge of the nucleus, decreasing an atom’s effective nuclear charge.
5. When my dad dropped the coffee mug I made for him, I wished that I had made it out of something malleable instead of something \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ like porcelain.
6. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of metals increases down a group because valence electrons are farther away from the nucleus, making it easier for them to participate in chemical reactions.
7. Elements in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ family frequently bond with alkali metals because they have 7 valence electrons.
8. The atomic radius of Mg+2 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than the atomic radius of Mg, whereas the atomic radius of N-3 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than the atomic radius of N.

**Part 2: Valence Electrons**

Use your knowledge of valence electrons and the periodic table to complete the table below (13 points).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *Element Symbol* | *Group* | *Period* | *Periodic Family (AM, AEM, TM, H, NG)* | *Valence Electrons* | *Gain or Lose Electrons?* | *# It Will Gain/Lose* | *Charge* |
| Rb |  |  |  |  |  |  |  |
|  | 18 | 3 |  |  |  |  |  |
| Br |  |  |  |  |  |  |  |
|  |  | 4 | AEM |  |  |  |  |

**Part 3: Periodic Trends**

1. Arrange the following elements from largest to smallest electronegativity (2 points each):
   1. Au, Zn, S, Si ­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. P, S, Cl, Ne \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Arrange the following elements from smallest to largest ionization energy (2 points each):
   1. Li, Be, Mg, Na \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. S, O, Ne, Al \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Circle the most reactive element (1 point each):
   1. S or F
   2. Ni or Ru
   3. C or Xe
   4. Be or Sr
4. Circle the element with the largest atomic radius (1 point each):
   1. S or Ag
   2. O or O-2
   3. Al or Al+3
   4. Mg+2 or Rb+1

**Part 4: Short Answer**

1. Since elements are listed in the periodic table in order of increasing atomic number and arranged so that elements with similar properties fall into the same group, the periodic table can be used to predict similarities and differences between elements.
   1. Bromine and fluorine are both in group 17 of the periodic table. Describe two properties of bromine and fluorine that are the same.
   2. Bromine and fluorine are in different periods of the periodic table. Describe two properties of bromine and fluorine that are different.
   3. Based on their positions in the periodic table, bromine and fluorine are most likely to form ionic compounds with an element from which group: 1, 14, or 18? Explain your choice.
2. Explain why fluorine has a smaller atomic radius than both oxygen and chlorine.
3. Would you expect metals or nonmetals in the same period to have higher ionization energies? Explain your answer.
4. Explain why sodium has a higher electronegativity than argon but a lower ionization energy than lithium.